Hyperfine Interact (2017) 238: 85
https://doi.org/10.1007/s10751-017-1457-z

Mössbauer spectroscopy under acoustical excitation: thick target effects

E. K. Sadykov[1] · A. A. Yurichuk[1] · F. G. Vagizov[1] · Sh. I. Mubarakshin[1] · A. A. Valiullin[1]

Published online: 7 November 2017

Abstract A new model of Mössbauer absorption (transmission) spectra with an adequate analysis of the possible effects of acoustic excitation in the thick targets is proposed. In particular, the dependence of the line width of acoustical satellites on the degree of phase correlation of the sound oscillations of resonant nuclei in the target is established by calculations and confirmed in experiment. Such a model is stimulated by an increase in the informativeness of the Mössbauer experiments, using thick samples in ultrasound (US) field, and by possible applications of this research technique. The test measurements of Mössbauer absorption spectra on stainless steel are carried out. The fitting of these spectra confirms the relevance of modifications of the model base of Mössbauer processes in US field.

Keywords Mössbauer absorption · Acoustical modulation · Raman scattering · Thickness effect

1 Introduction

Acoustic modulation of Mössbauer spectra (MS) was discovered already in the period of formation of gamma resonance spectroscopy [1]. The mechanism of realization of this phenomenon is closely related to the Mössbauer effect, and after the first experiments, it was

This article is part of the Topical Collection on *Proceedings of the International Conference on the Applications of the Mössbauer Effect (ICAME 2017), Saint-Petersburg, Russia, 3-8 September 2017*
Edited by Valentin Semenov

✉ E. K. Sadykov
esadykov@kpfu.ru

[1] Kazan (Volga Region) Federal University, Kremlevskaya str. 18, Kazan, 420008, Russia